

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request reexamination and reconsideration of the application in view of the preceding amendments and the following remarks.

The Examiner objects to the claims because the wording "and/or" renders the claims indefinite. As shown above under AMENDMENT E, the applicants have removed "and/or" from the claims.

The Examiner rejects claims 35-39, 42-44, 46-51, 54-57 and 59 under 35 U.S.C. 103(a) as being unpatentable over Wood (U.S. Patent No. 4,511,815) in view of Nakamura *et al.* (U.S. Patent No. 4,976,101) and claims 58 and 60 under 35 U.S.C. §103(a) as being unpatentable over Wood in view of Nakamura, and further in view of Dassonville (U.S. Patent No. 4,370,607).

To advance prosecution, the applicants have amended independent claim 35 to recite in part: "wherein the plurality of switches are substantially simultaneously switched on by a time varying electrical control on-pulse and maintained in an on state for a predetermined extended length of time by a plurality of time varying electrical control on pulses produced by said control driver, said on-pulses being substantially of a first polarity, and wherein the plurality of switches are substantially simultaneously switched off by a time varying electrical control off-pulse and maintained in an off state for a predetermined extended length of time by a plurality of time varying electrical control off-pulses produced by said control driver, said off-pulse being substantially of a second polarity, said second polarity being opposite to said first polarity."

The module as now recited in applicants' amended claim 35 clearly recites that the

plurality of switches are switched on and maintained in an on state for a predetermined extended length of time by a plurality of time varying electrical control on-pulses, and are substantially simultaneously switched off and maintained in an off state for a predetermined extended length of time by a plurality of time varying electrical control off-pulses. The applicants have also amended independent claims 47 and 60 to similarly recite this feature.

In sharp contrast, Wood does not teach, suggest or disclose a plurality of switches which can be switched on and maintained in an on state for a predetermined extended length of time by a plurality of time varying electrical control pulses and substantially simultaneously switched off and maintained in an off state for a predetermined extended length of time by a plurality varying electrical control off-pulses pulses.

Instead, Wood relies on the down transition of a single control signal, indicated by arrow 100, to turn the desired switch (MOSFET 10) on, indicated by arrow 102. *See* Figs. 1 and 2a-2d of Wood, (copies attached hereto as Exhibit A), and Fig. 4. Wood then relies on the up transition of the same signal, indicated by arrow 104 to turn the switch off, as indicated by arrow 106. *See also* col. 3, line 7 to col. 4, line 4. Clearly, Wood relies on a single pulse to turn the switch on and off.

Moreover, the design of Wood requires a hard shut-off of the alleged switch, MOSFET 10, as indicated by arrow 104 of Exhibit A, to mitigate gate leakage of MOSFET 10 from causing spontaneous and uncontrolled opening of MOSFET 10 as switch. Therefore, the design of Wood prevents keeping the alleged switching device (MOSFET 10) on and maintained in an on state for a predetermined extended length of time as now claimed by the applicants in independent claims 35, 47 and 60. As shown by arrow 110 of Exhibit B attached hereto, the down transition of the single logic signal of Wood turns the

switch on as indicated by arrow 112. However, if this signal is maintained in the on position for any predetermined extended length of time, as indicated by arrow 114, the alleged switch 10 (MOSFET 10) of Wood undergoes gate leakage, indicated by arrow 116. The result of such leakage can lead to a cascading failure of the remaining switches, e.g., the plurality of switches 10 shown in Fig. 4 of Wood, known as a “zipper effect.” Wood clearly teaches that the on time of switch 10 is limited by this leakage: “Once the transformer 17 saturates, the intrinsic diode 26 isolates the collapse of the voltage of winding 18 from the gate 20 of power MOSFET 10. Therefore, the input gate capacitance of the MOSFET 10 remains charged and holds the gate biased in a fully enhanced condition of time limited only by the gate leakage current of power MOSFET 10 as shown, for example in FIG. 2c.”, Col 3, lines 43-50, emphasis added.

In contrast, the applicants’ modulator as recited in amended independent claim 35 utilizes a plurality of switches that can be switched on and maintained in an on state for a predetermined extended length of time by a plurality of time varying electrical control on-pulses and substantially simultaneously switched off and maintained in an off state for a predetermined extended length of time by a plurality of time varying electrical control off-pulses. The claimed modulator can produce a plurality of time varying control on-pulses, indicated by arrows 116, 118, 120, and 122, of Exhibit B to turn the plurality of switches on, as indicated by arrow 124, and maintain the switches in an on state for a predetermined extended length of time. The claimed modulator also can produce a plurality of time varying control off-pulses, indicated by arrows 128, 130, 132, and 134 to turn the plurality of switches off and maintain the switches in a off state for a predetermined extended length of time. This eliminates the limitation on time inherent in Wood.

Clearly, the claimed plurality of time varying electrical control on-pulses which maintain the plurality of switches in an on state for a predetermined extended length of time and the plurality of time varying electrical control off-pulses which maintain the plurality of switches in an off state for a predetermined extended length of time as recited in applicants' independent claim 35 are not disclosed, taught or suggested by Wood.

Therefore, Wood does not teach, suggest, or disclose each and every element of the applicants invention as recited in amended independent claim 35, namely, a plurality of switches which are simultaneously switched on and maintained in an on state for a predetermined extended length of time by a plurality of time varying electrical control on pulses and wherein the plurality of switches are simultaneously switched off and maintained in an off state for a predetermined extended length of time by a plurality of time varying electrical control off pulses.

Applicants' independent claims 47 and 60 similarly recite in part a plurality of time varying electrical control on-pulses (or signals) which maintain the plurality of switches in an on-state for a predetermined extended length of time and a plurality of time varying control off-pulses (or signals) which maintain the plurality of switches in an off state for a predetermined extended length of time.

Accordingly, Wood does not teach, suggest, or disclose each and every element of the applicants' invention as recited in independent claims 35, 47 and 60.

Accordingly, applicants' independent claims 35, 47 and 60 are allowable and patentable under 35 U.S.C. §103 over Wood in view of Nakamura. Because dependent claims 36-39, 42-44, 46, 48-51, 54-59 depend from allowable base claims, claims 36-39, 42-44, 46, 48-51, 54-59 are clearly allowable and patentable under 35 U.S.C. §103 over

Wood in view of Nakamura.

The Examiner rejects claims 40, 41, 52, and 53 under 35 U.S.C. 103(a) as being unpatentable over Wood (U.S. Patent No. 4,511,815) in view of Gaudreau *et al.* (U.S. Patent No. 5,646,833). The Examiner further rejects claim 45 under 35 U.S.C. 103(a) as being unpatentable over Wood in view of Nakamura and further in view of Bourgeois (U.S. Patent No. 5,469,041).

As shown above, Wood does not disclose each and every element of applicants' independent claims 35 and 47. Because claims 40, 41, 45, 52, 53, and 58 depend from allowable base claims, claims 40, 41, 45, 52, 53, and 58 are clearly allowable and patentable under 35 U.S. C. §103 over Wood in view of Gaudreau, Nakamura and Dassonville. Because Wood does not disclose each and every element of applicants' independent claim 60, claim 60 is clearly allowable and patentable under 35 U.S. C. §103 over Wood in view of Nakamura and Dassonville.

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the application is in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, at (781) 890-5678.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'RJC', followed by a horizontal line.

Roy J. Coleman
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